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	Application Number	09/847,093
	Filing Date	05/02/2001
	First Named Inventor	HENRY MICHAELS BEISNER
	Art Unit	3662
	Examiner Name	BRIAN K. ANDREA
Total Number of Pages in This Submission: 5	Attorney Docket Number	

ENCLOSURES (*Check all that apply*)

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  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
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- [ ] Information Disclosure Statement
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Firm or Individual name	HENRY MICHAELS BEISNER
Signature	Henry Michaels Beisner
Date	5/16/2004

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Applicant : Henry Michaels Beisner
Appl. No. : 09/847,093
Filed : 05/02/2001
Title : Adaptive Filter to Reduce Multipath
Grp./A.U. : 3662
Examiner : Brian K. Andrea

Honorable Commissioner for Patents

Washington, DC 20231

APPEAL REPLY BRIEF

Sir:

The examiner alleges that the specification does not enable the claims, yet he is not making an enablement, first paragraph, rejection, nor does he explain why not. This is incorrect.

The examiner says that he did not understand:
"(1) Calculation and application of the filter weights used in the filter, and (2) How the removal of multipath is accomplished using the filter of the present invention." Yet, he now says "It is understood how the filter weights are calculated." He also says "It is understood that filtering is used for removing the multipath from the received signal in the present invention." This is obviously self contradictory. However, he maintains that he doesn't understand "how each element of the filtering process is used in the present application and how each element works with other elements to accomplish the removal from the signal." Again, this is self contradictory. It also is so general as to be not in keeping with MPEP 2164.04 Burden on the Examiner. The examiner must "make specific findings of fact, supported by the evidence, and then draw conclusions based on these findings of fact." In the case of missing information, "the examiner should specifically identify what information is missing and why one skilled in the art could not supply the information without undue experimentation."

Addressing this latter objection, I say again that the multipath reflections are removed by "least squares." The output, the residual, is the purified signal. The process of least squares adjusts the filter coefficients, which mimic the reflections, subtracting them from the corrupted signal, to minimize the output, the residual. When the residual is minimized, the reflections have been removed and the residual is the purified signal.

This explanation should be clear to a person with ordinary skill in the art of digital signal processing. However, I submitted a detailed description of the whole process in an amendment. This amendment was rejected as new matter in spite of the fact that it was nonessential, for explanation only. This is a "Catch 22" situation. The examiner has not established the level of skill in the art required to understand and build the invention. Does it include a knowledge of least squares? He does not mention least squares. We assert that the level of skill in the art required is established by the book by Hayes which includes least squares.

The fact that the examiner does not mention least squares indicates that he does not understand this basic signal processing technique. This is unfortunate because it is the key to understanding the invention.

We maintain that it is reasonable to expect the examiner to understand least squares. From the following explanation, it will be clear that an understanding of least squares is key to understanding the process.

All of the examiner's objections can be easily fixed except for his inability to understand the essence of my invention. This objection will now be addressed.

The examiner has made two glaring omissions in all his communications: 1. he makes no reference to "least squares"; 2. he makes no reference to the computer code that is part of my application.

He does not understand my explanation of how the digital filter coefficients are determined. They are determined by "least squares." This is central to understanding the process. Since the examiner has avoided all references to "least squares," one suspects that he does not understand the concept of "least squares." It follows that he cannot understand my

explanation. Least squares is a method understood by one with ordinary skill in the art of digital signal processing [book by Hayes].

Since the specification is to give enough information for one with ordinary skill in the art of digital signal processing to build and use the invention, the computer code included in the application fulfills this requirement. Anyone with ordinary skill in the art of digital signal processing and who takes the time to read the code has a complete example of the implementation of the method, and without undue experimentation can build his own implementation and apply it. Unfortunately, the examiner makes no reference to the computer code.

The process described in the application is as follows. The problem solved by the invention is that a direct path signal is corrupted by reflections from stationary and moving objects. These reflectors create modified versions of the direct path signal. A reflector modifies the direct path signal by delaying it, frequency shifting it, changing its amplitude and changing its phase. The adaptive filter does two things: 1. it purifies the corrupted direct path signal and 2. takes this purified form and modifies it in a manner replicating each reflector and subtracts it from the original corrupted signal, completing the process, i.e., creating the purified version of the direct path signal.

This subtraction is accomplished by the method of least squares. Each modifying characteristic of each reflector has a corresponding filter coefficient, e.g., for delay, frequency shift, amplitude and phase. The values of these filter coefficients are varied by least squares in such a manner so as to cause the residual to be minimized.

This is accomplished by repeatedly processing a selected time segment of samples of the original corrupted signal. The first step has all filter coefficients zero, that is, nothing is subtracted from the original signal and the output, i.e., the residual, is the same as the original input.

Although the output is corrupted with reflections, the major portion is the direct path. This output is used in the second step to form replicas of the reflected signals and to subtract them from the corrupted signal by least squares to form a new residual output which is an improved approximation to the direct path signal.

This process is repeated until it converges. In the computer code example, it converged in three steps. At convergence, the significant reflections are removed because the process mimics, nearly exactly, the process of the formation of the reflections.

This is all demonstrated in the computer code along with the results. Again, a person with ordinary skill in digital signal processing and who takes the time to read the computer code can build a working device.

Respectfully submitted,

Signed: Henry Michaels Beisner

Henry Michaels Beisner, Ph. D., Physics

Date: 05/16/2004

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